

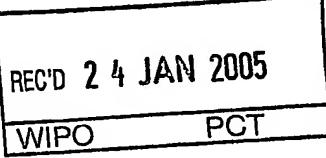


PCT/FR/2004/02843

22 NOV. 2004

INVESTOR IN PEOPLE

BEST AVAILABLE COPY



The Patent Office
Concept House
Cardiff Road
Newport
South Wales
NP10 8QQ

I, the undersigned, being an officer duly authorised in accordance with Section 74(1) and (4) of the Deregulation & Contracting Out Act 1994, to sign and issue certificates on behalf of the Comptroller-General, hereby certify that annexed hereto is a true copy of the documents as originally filed in connection with the patent application identified therein.

In accordance with the Patents (Companies Re-registration) Rules 1982, if a company named in this certificate and any accompanying documents has re-registered under the Companies Act 1980 with the same name as that with which it was registered immediately before re-registration save for the substitution as, or inclusion as, the last part of the name of the words "public limited company" or their equivalents in Welsh, references to the name of the company in this certificate and any accompanying documents shall be treated as references to the name with which it is so re-registered.

In accordance with the rules, the words "public limited company" may be replaced by p.l.c., plc, P.L.C. or PLC.

Re-registration under the Companies Act does not constitute a new legal entity but merely subjects the company to certain additional company law rules.



Signed

Dated 4 November 2004

DOCUMENT DE PRIORITÉ

PRÉSENTÉ OU TRANSMIS
CONFORMÉMENT À LA
RÈGLE 17.1.a) OU b)

16 OCT 2004

16 OCT 2004 E934110-1 D02481
P01/7700-0.00-0423024.9 NONENEWPORT
Request for grant of a patent

(See the notes on the back of this form. You can also get an explanatory leaflet from the Patent Office to help you fill in this form)

The Patent Office

Cardiff Road
Newport
South Wales
NP10 8QQ

1. Your reference

P38122-/MGO/JDB

2. Patent application number

(The Patent Office will fill this part in)

16 OCT 2004

0423024.9

3. Full name, address and postcode of the or of each applicant (underline all surnames)

Europalacer Industries SAS
Route De Cholet
85620 Rocheserviere
France

Patents ADP number (if you know it) 08966673001

If the applicant is a corporate body, give the country/state of its incorporation France

4. Title of the invention

"Apparatus and Method of Modular Belt Distribution of Stick Fed Components"

5. Name of your agent (if you have one)

Murgitroyd & Company

"Address for service" in the United Kingdom to which all correspondence should be sent (including the postcode)

Scotland House
165-169 Scotland Street
Glasgow
G5 8PL

Patents ADP number (if you know it)

00001198015

6. Priority: Complete this section if you are declaring priority from one or more earlier patent applications, filed in the last 12 months.

Country

Priority application number
(if you know it)Date of filing
(day / month / year)

7. Divisionals, etc: Complete this section only if this application is a divisional application or resulted from an entitlement dispute (see note f)

Number of earlier UK application
Date of filing
(day / month / year)

8. Is a Patents Form 7/77 (Statement of inventorship and of right to grant of a patent) required in support of this request?

Yes

Answer YES if:

- a) any applicant named in part 3 is not an inventor, or
- b) there is an inventor who is not named as an applicant, or
- c) any named applicant is a corporate body.

Otherwise answer NO (See note d)

Patents Form 1/77

9. Accompanying documents: A patent application must include a description of the invention. Not counting duplicates, please enter the number of pages of each item accompanying this form:

Continuation sheets of this form

Description	14
Claim(s)	3
Abstract	1
Drawing(s)	3

CF

10. If you are also filing any of the following, state how many against each item.

Priority documents

Translations of priority documents

Statement of inventorship and right to grant of a patent (Patents Form 7/77)

Request for a preliminary examination and search (Patents Form 9/77)

Request for a substantive examination (Patents Form 10/77)

Any other documents (please specify)

11. I/We request the grant of a patent on the basis of this application.

Signature(s)

Date 15/10/2004

12. Name, daytime telephone number and e-mail address, if any, of person to contact in the United Kingdom

James D Brown
01224 706616

Warning

After an application for a patent has been filed, the Comptroller of the Patent Office will consider whether publication or communication of the invention should be prohibited or restricted under Section 22 of the Patents Act 1977. You will be informed if it is necessary to prohibit or restrict your invention in this way. Furthermore, if you live in the United Kingdom, Section 23 of the Patents Act 1977 stops you from applying for a patent abroad without first getting written permission from the Patent Office unless an application has been filed at least 6 weeks beforehand in the United Kingdom for a patent for the same invention and either no direction prohibiting publication or communication has been given, or any such direction has been revoked.

Notes

- a) If you need help to fill in this form or you have any questions, please contact the Patent Office on 08459 500505.
- b) Write your answers in capital letters using black ink or you may type them.
- c) If there is not enough space for all the relevant details on any part of this form, please continue on a separate sheet of paper and write "see continuation sheet" in the relevant part(s). Any continuation sheet should be attached to this form.
- d) If you have answered YES in part 8, a Patents Form 7/77 will need to be filed.
- e) Once you have filled in the form you must remember to sign and date it.
- f) Part 7 should only be completed when a divisional application is being made under section 15(4), or when an application is being made under section 8(3), 12(6) or 37(4) following an entitlement dispute. By completing part 7 you are requesting that this application takes the same filing date as an earlier UK application. If you want the new application to have the same priority date(s) as the earlier UK application, you should also complete part 6 with the priority details.

1 "Apparatus and Method of Modular Belt Distribution
2 of Stick Fed Components"

3

4 The present invention finds its application in the
5 field of electronic component assembly and more
6 particularly with pick and place machines used to
7 mount electronic components such as integrated
8 circuits (hereinafter referred to as "chips") or
9 Surface Mounted Devices ("SMDs") on printed circuit
10 boards. Moreover, it relates to the distribution of
11 such components (which are usually packaged in
12 sticks, generally made of plastic or metal) and a
13 distribution device is used to feed these
14 components, one at a time, to a head of the pick and
15 place machine head.

16

17 In order to distribute and present such electronic
18 components, one at a time, to the head, several
19 conventional systems and methods are used in the
20 prior art. Components can be brought by gravity to
21 the pick and place head, and this method requires an
22 oblique/angled slope or canal that can interfere

1 with the pick and place head. When the component
2 supply canal has to be horizontally orientated, e.g.
3 because of congestion problems, it is possible to
4 feed components using vibrations. However, as the
5 feeding of components is not positive, these
6 machines are often slow. Furthermore, vibrations
7 are sometimes difficult to optimise because of the
8 mass variations of the vibrating set when the
9 component number is decreasing. In some instances,
10 components are fed on a horizontal part of the
11 machine by one or several belt distributors. The
12 feeding is then more positive and the component
13 transport is faster.

14

15 In the belt distributors referred to above, a first
16 arrangement consists in integrating, on a base, a
17 single wide belt on which are generally fed several
18 components. The problem of this configuration is
19 that components (such as chips) resting on the belt
20 are standing on their leads, and because of the
21 inevitable friction, there is a high risk of
22 damaging or contaminating them. To prevent this
23 problem, other devices consist of providing, on the
24 same base, several belts, each being arranged to
25 convey a certain type of component by its body,
26 without touching its leads. The base is thus an
27 autonomous system which includes belts, driving
28 motors and command systems, and such a prior art
29 system is shown in Figure 1. The major disadvantage
30 of these devices is that the base must be configured
31 for one or several types of component of which the
32 size is known in advance, making it difficult if not

1 impossible to change the configuration (i.e.
2 position/size) of the belts on the base in order to
3 fit components of various sizes. Accordingly, every
4 such conventional autonomous distribution device is
5 dedicated to one or to a combination of component
6 types. Meanwhile, the pick and place equipment
7 should satisfy a need of flexibility that this kind
8 of device cannot achieve. Furthermore, when a new
9 type of component or a new combination of components
10 is to be implemented, this type of equipment imposes
11 the requirement to change the whole base, meaning
12 additional time and expense.

13

14 According to a first aspect of the present
15 invention, there is provided a distribution system
16 for transfer of components to a position for picking
17 by a pick and place machine head, the distribution
18 system according to claim 1.

19

20 According to a second aspect of the present
21 invention, there is provided a component distributor
22 module for use in a distribution system for the
23 transfer of components to a position for picking by
24 a pick and place machine head, the component
25 distributor module according to Claim 9

26

27 According to a third aspect of the present
28 invention, there is provided a base portion for use
29 in a distribution system for the transfer of
30 components to a position for picking by a pick and
31 place machine head, the base portion according to
32 claim 10.

1 Preferred and/or optional features of the
2 distribution system are set out in the dependent
3 claims.

4

5 Preferably, the distribution system further
6 comprises a control system and the base portion
7 further comprises a second motive means to drive a
8 common retractable bar which is typically provided
9 with a spring means to assist return of the common
10 retractable bar to a position closest to the
11 components to be picked.

12

13 Typically, a plurality of individual component
14 distributor modules are provided with each module
15 having a belt means adapted to the width of a class
16 of components.

17

18 Preferably, a single first motive means is provided
19 for the base portion and which is adapted to drive
20 each and every belt means of the respective
21 plurality of component distributor modules via a
22 transmission mechanism which typically ensures the
23 synchronous rotation of the belt means for each of
24 the distributor modules. The transmission mechanism
25 preferably comprises a horizontally arranged geared
26 member into which each of the component modules
27 couples via respective geared means.

28

29 Embodiments of the present invention have the
30 advantage that they allow fast loading and unloading
31 of the modular component distributor modules on a
32 universal common base portion, by means of an

1 accurate location means at one side, and typically
2 every component distributor module is typically at
3 least partially provided with a notch and locating
4 bar or the like at one side to permit an accurate
5 location and is further typically at least partially
6 provided with a fast fitting element.

7

8 Embodiments of the present invention will now be
9 described, by way of example only, with reference to
10 the accompanying drawings, in which:-

11 Fig. 1 is a schematic end view of a component
12 belt transfer device according to the prior
13 art;

14 Fig. 2 is a schematic end view of an embodiment
15 of a component distribution system according to
16 the present invention;

17 Fig. 3 is a side view of the component
18 distribution system of Fig. 2 showing a
19 universal base and an individual drive module;

20 Fig. 4 is a side view of the individual drive
21 module of Fig. 3;

22 Figs. 5 and 6 are schematic representations
23 during the operation of picking a component
24 from an individual detachable module of Fig. 3;
25 and.

26 Figs. 7 and 8 are schematic representations of
27 an individual detachable module which has not
28 had a component picked from it.

29

30 Fig. 1 represents a device according to the prior
31 art for transferring electronic components 8, such
32 as chips 8". The device of Fig. 1 comprises a base

1 6' which is an autonomous system which integrates
2 belts 12', drive system (not shown) and the command
3 system therefor (not shown). If another type of
4 component 8 must be transported, it is necessary to
5 change the base 6'.

6 "
7 Fig. 2 illustrates an end view of a system according
8 to the present invention which includes a universal
9 common base 6 and component 8 belt distribution
10 modules 1 (also hereinafter referred to as lane 1).
11 The distribution modules 1 are independent from one
12 another and are detachable from the universal common
13 base 6. A common motor 4 associated with the
14 universal base 6 drives a common interface
15 mechanism, which in Fig. 3 is depicted as a gear
16 shaft 3 driving the belts 12 through geared wheels
17 14 arranged on each module 1.

18
19 Fig. 3 illustrates the embodiment of the present
20 invention as comprising the universal base 6 and the
21 individual distribution module 1. The
22 aforementioned module 1 is detachable from the base
23 6 and moreover can be quickly secured to and
24 detached from the base 6 by operation of releasable
25 fixing means or fitment means, which are shown in
26 Fig. 3 as being in the form of a notch which acts as
27 a front stop 10 and a rear fitting clip 2.

28
29 A retractable stop 9 integrated into the common base
30 6 assists an individually fed component 8 to be
31 picked up by the pick and place head (not shown) at
32 the end of the transfer belt 12. This stop 9 is

1 activated by an electromagnet 7 and it is adjustable
2 according to the length of the component 8 in order
3 to feed only one component 8 to the correct position
4 to be picked up by the pick and place head. This
5 stop 9 is retractable in order to avoid any pressure
6 being exerted on the component 8 while the machine
7 head (not shown) picks it up.

8

9 Fig. 4 shows an individual distribution module 1
10 according to the invention. Every individual
11 distribution module 1 is autonomous and includes a
12 belt 12 for transporting components 8. This belt 12
13 is guided by bearings 15 having smooth outer
14 circumferences. The belt 12 is driven by the geared
15 wheel 14 which in turn is driven by the gear shaft 3
16 located on the universal base 6. The slope 11 is
17 used as a component reservoir and as a stick guide.
18 The location of the distribution module 1 on the
19 universal base 6 is achieved by the notch or groove
20 10 located at the front of the distribution module 1
21 locating around a roller 34 provided on the
22 universal base 6. The rear end of the distribution
23 module 1 is then lowered onto the universal base 6
24 and a downwardly projecting pin 13 located at the
25 back of the module 1 locates in a hole (not shown)
26 provided in the upper surface of the universal
27 common base 6.

28

29 The size of every individual distribution module 1,
30 and more particularly, the width of the belt 12 for
31 each individual distribution module 1, depends on
32 the component 8 to be brought to the machine head.

1 Accordingly, the width of the belt 12 for each
2 individual distribution module 1 is chosen such that
3 it is approximately equal to the width of the body
4 of the components 8 such that when a component 8 is
5 placed on the belt 8, it will lie on top of the belt
6 12 on its underside or belly, with the component's
7 legs being situated laterally of the belt 12 such
8 that the legs of the components 8 straddle and hang
9 down from the belt 12.

10

11 The interaction between the components 8, 8' and the
12 movement of the belt 12 and retractable stop 9 is
13 shown in Figs. 5 to 8.

14

15 The components 8 are initially contained in a stack
16 within a tube (not shown) which is placed on the
17 angled slope 11 in the correct orientation so that
18 the components 8 are fed onto the slope 11 end of
19 the belt 12 in the correct orientation. The
20 components 8 are thus sitting on top of the belt 12
21 with their legs straddling the belt 12 and when the
22 belt moves in the direction of arrow 22 in Fig. 5
23 (the upper portion of the belt moving from right to
24 left toward the picking location in Fig. 5), the
25 components 8' pass underneath upper guide path 20.
26 Fig. 5 is a schematic diagram showing one belt 12
27 after the components 8, 8' have been pushed right to
28 left by the belt 12. The friction created between
29 the belt 12 and the components 8, 8' generates a log
30 jam or a compression between the components 8, 8',
31 and as shown in Fig. 5, the components 8, 8' will
32 tend to fill the gap between the upper surface of

1 the belt 12 and lower surface of the upper guide
2 path 20, since the retractable stop 9 as shown in
3 Fig. 5 is preventing any further right to left
4 travel in the direction of arrow 22 of the left hand
5 most component 8. Accordingly, the force acting
6 upon component 8 in Fig. 5 by the following
7 components 8' is shown as arrow 18. Accordingly, if
8 a pick and place head were to try and pick the
9 component 8 up by means of a conventional vacuum
10 nozzle suction action, if the force 18 is too high,
11 the picking action may fail since the component 8 is
12 effectively locked in position between the
13 retractable stop 9 and the following components 8'.
14

15 To avoid the potential failure of the picking
16 action, the belt 12 is stopped momentarily and the
17 stop 9 is retracted or moved from right to left as
18 shown in Fig. 6, and in so doing, creates a gap
19 between it 9 and the component 8 to be picked which
20 therefore releases the pressure on the component 8.
21

22 As can be seen in Fig. 6, the upper guide path 20 is
23 arranged to only extend as far as the left hand most
24 component 8', such that the upper guide path 20 will
25 not interfere in the picking action of the component
26 8. Accordingly, the pick and place head can now be
27 moved into position above the component 8 and when
28 its suction action is activated, can pick the
29 component 8 in an upwards direction.
30

31 If only one individual detachable distribution
32 module 1 is in use, the components 8' sitting on

1 that belt 12 can then be advanced from right to left
2 to the position shown in Fig. 5 and the above noted
3 steps set out for Figs. 5 and 6 can then be
4 repeated.

5

6 However, where more than one individual detachable
7 distribution module 1 is located on the universal
8 common base 6, as shown in Fig. 2, further steps set
9 out below in Figs. 7 and 8 are desirable.

10

11 Figs. 7 and 8 show non-used lanes and as the reader
12 will appreciate, all of the belts 12 of all of the
13 individual detachable distribution modules 1 are
14 moved simultaneously due to the common motor 4.

15 Accordingly, in Fig. 7, the component 8 has not been
16 picked. However, at this point it is desirable to
17 reverse the belt 12, that is from left to right as
18 shown by arrow 24 in Fig. 7. The reason for this
19 reverse movement of the belt 12 is because all of
20 the retractable stops 9 of all of the individual
21 detachable distribution modules 1 are coupled to the
22 single electromagnet 7. Therefore, if the
23 retractable stop 9 were moved back to the position
24 shown in Fig. 5 in a lane 1 where the component 8
25 had not been picked (as for example in Fig. 7) there
26 is a risk that the retractable stop 9 will hit or
27 collide with the unpicked component 8 with the risk
28 of it jumping off the belt 12. Accordingly, for
29 this reason, the belt 12 is driven backwards (i.e.
30 in the direction of arrow 24 in Figs. 7 and 8) to
31 move the unpicked component 8 further away from the
32 retractable stop 9, typically by about 1 to 2 mm.

1

2 The retractable stop 9 is then moved in the
3 direction of the arrow shown in Fig. 8 (i.e. from
4 left to right) toward the unpicked component 8, but
5 without any risk of immediately touching the
6 unpicked component 8.

7

8 The detachable distribution modules 1 are then ready
9 for a new cycle of steps starting from Fig. 5 and
10 thus all the belts 12 can be moved again in the
11 direction of arrow 22. Of course, the unpicked
12 components 8 on the non-used lanes of Figs. 7 and 8
13 will arrive very quickly at the stop 9. However,
14 because the body of conventional chips or surface
15 mounted devices (SMD's) 8 can slip on the belt 12,
16 the configuration of the components 8' in Fig. 6
17 does not stop or otherwise jam the belt 12.
18 Accordingly, the substantial lack of friction
19 between the underside or belly of the components 8
20 and the belt 12 reiterates the importance that the
21 fragile leads of the components 8 must not lay on
22 the belts 12.

23

24 It should be noted that the individual retractable
25 stops 9 are mounted on a common bar 28 on the
26 universal common base 6, wherein the individual
27 retractable stops 9 can be individually configured
28 by individually moving them either closer to their
29 respective detachable distribution modules 1 or
30 further away from the respective detachable
31 distribution modules 1 by means of tightening/

1 loosening fastening means 26 such as screws or the
2 like, such that the retractable stops 9 for each of
3 the individual detachable distribution modules 1 can
4 be adjusted depending upon the exact length of the
5 component 8 requiring to be picked.

6

7 A control module 30 is provided at the front or user
8 end of the universal common base 6 which includes a
9 microprocessor on an electronic board (not shown),
10 the internal memory of which provides the
11 possibility to "instruct" the individual detachable
12 distribution modules 1 as to the nature and
13 reference of the components 8, 8' being supplied to
14 it. Furthermore, the microprocessor in the control
15 module 30 can count the number of components 8, 8'
16 to be picked and the internal memory of which can be
17 uploaded by connecting it to a micro terminal which
18 is able to read barcodes attached to the side of the
19 tube or stick of components 8, 8'. Furthermore, the
20 control module 30 is connected to the pick and place
21 machine by means of an electrical bus (not shown)
22 and information can be exchanged between the control
23 module 30 and the pick and place machine in both
24 directions. As seen in Fig. 2, the individual
25 distribution modules 1 can be placed at any location
26 along the width of the universal common base 6 and a
27 transmitter on the individual detachable
28 distribution modules 1 can be detected by a receiver
29 connected to the pick and place head of the pick and
30 place machine in order to provide the location of
31 the individual detachable distribution module 1
32 across the width of the universal common base 6.

1 Furthermore, if a lane or individual detachable
2 distribution module 1 has run out of components 8 or
3 if the picking of a component has failed several
4 times, an LED is lit on the front panel 31 of the
5 control module 30. Furthermore, a button 32 is
6 provided on each front panel 31 of the control
7 module for each lane 1 where the button 32 is wired
8 into the control module 30 such that after a lane 1
9 has been filled with components, the operator can
10 press the button to re-activate the lane 1 and
11 switch off the lit LED.

12

13 It should be noted that the components 8 do not need
14 to be supplied to the angled slope 11 in plastic
15 tubes or the like but could be supplied directly
16 onto the belt 12 or the angled slope 11 by means of
17 reeled tapes (not shown) of components 8 or the
18 like.

19

20 Accordingly, embodiments of the present invention
21 provide the advantage that they overcome the
22 apparently contradictory objectives of lesser
23 capital cost and greater flexibility.

24 Conventionally, when the goal has been to introduce
25 some flexibility into production systems, the
26 capital cost increases. Alternatively, when the
27 goal has been to decrease the capital cost of
28 investment it is to the detriment of the flexibility
29 of production. In contrast, embodiments of the
30 present invention provide the advantage in
31 dissociating the functions and in handling in a
32 different way the common functions and the specific

1 functions. In this way, the common functions will
2 only require to be invested once in terms of the
3 universal common base 6 and the specific functions
4 can be used in a flexible way in terms of the
5 individual distribution modules 1. Furthermore,
6 embodiments of the present invention provide the
7 advantage that they may be easily configurable
8 according to the production requirements.

9

10 Modifications and improvements may be made to the
11 embodiments hereinbefore described without departing
12 from the scope of the invention.

1 CLAIMS
2

3 1) A distribution system (1, 6) for transfer of
4 components (8) to a position for picking by a pick
5 and place machine head, the distribution system (1,
6 6) comprising:-

7 at least one component distributor module (1)
8 comprising a belt member (12) adapted to the width
9 of the component (8) to be transferred; and
10 a base portion (6) comprising a motive means
11 (4) adapted to drive a belt member (12) of the at
12 least one component distributor module (1);
13 characterised in that the at least one
14 component distributor module (1) is adapted to be
15 releasably fixed to the base portion (6).

16
17 2) The distribution system of claim 1, further
18 comprising releasable fixing means (34, 10; 13; 2)
19 arranged to act between the base portion (6) and the
20 at least one component distributor module (1).

21
22 3) The distribution system of claim 2, wherein the
23 releasable fixing means comprises a male member (34;
24 13) provided on one of the base portion (6) and the
25 at least one component distributor module (1), and a
26 female member (10) provided on the other of the base
27 portion (6) and the at least one component
28 distributor module (1), and a releasable locking
29 member (2) arranged to prevent the male (34; 13) and
30 female (10) members from disengaging from one
31 another when locked, and further arranged to permit
32 the female (10) and male (34; 13) members to engage/

1 disengage one another when unlocked.

2

3 4) The distribution system of claim 3, wherein the
4 male (34) and female (10) member are provided at one
5 side of the said one of the base portion (6) and the
6 at least one component distributor module (1), and
7 the releasable locking member (2) is provided at the
8 other side of the said one of the base portion (6)
9 and the at least one component distributor module
10 (1).

11

12 5) The distribution system of either of claims 3
13 or 4, wherein the male member (34; 13) comprises a
14 protruding member (34; 13) and the female member
15 (10) comprises a groove or the like (10), the
16 protruding member (34; 13) and groove (10) arranged
17 to provide a close fit with one another.

18

19 6) The distribution system of any of claims 3 to
20 5, wherein the releasable locking member comprises a
21 clip means (2) provided on one of the base portion
22 (6) and the at least one component distributor
23 module (1), wherein the clip means (2) can be
24 releasably secured to the said one (6; 1) whilst
25 securely trapping a portion of the other of the base
26 portion (6) and the component distributor module
27 (1).

28

29 7) The distribution system of any preceding claim,
30 characterized by the transfer of the component (8)
31 by the belt (12) to a location in which the
32 component (8) is held from further movement by a

1 retractible member (9) until the component (8) is
2 picked by the pick and place head.

3

4 8) The distribution system of claim 7, wherein the
5 retractible member (9) is provided on the base
6 portion (6) and driven by a second motive means (7)
7 provided on the base portion (6).

8

9 9) A component distributor module (1) for use in a
10 distribution system (1, 6) for the transfer of
11 components (8) to a position for picking by a pick
12 and place machine head, the component distributor
13 module (1) comprising:-

14 a belt member (12) adapted to the width of the
15 component (8) to be transferred;

16 and releasable fixing means (10; 13; 2) to
17 permit the component distributor module (1) to be
18 releasably secured to a base portion (6).

19

20 10) A base portion (6) for use in a distribution
21 system (1, 6) for the transfer of components (8) to
22 a position for picking by a pick and place machine
23 head, the base portion (1) comprising:-

24 a motive means (4) adapted to drive a belt
25 member (12) of at least one component distributor
26 module (1); and

27 releasable fixing means (34 ; 2) to permit one
28 or more component distributor modules (1) to be
29 releasably secured to the base portion (6).

1 ABSTRACT

2

3 MODULAR DEVICE FOR BELT DISTRIBUTION
4 OF SURFACE MOUNTED COMPONENTS

5

6 A distribution system (1, 6) of stick fed components
7 (8) by transfer belts (12) to deliver the components
8 (8) to a location in which they can be picked by a
9 pick and place machine head. The system includes a
10 universal base portion (6) which preferably
11 integrates a common motor (4) and an interface
12 gearing system (3) which can drive belts (12) of one
13 or more independent and detachable distributor
14 modules (1). One or more independent and detachable
15 distributor modules (1), with belts (12) adapted to
16 the component width, are releasably but securely
17 fixed to the universal base (6) according to the
18 surface mounted device production requirements.

PL 1/2

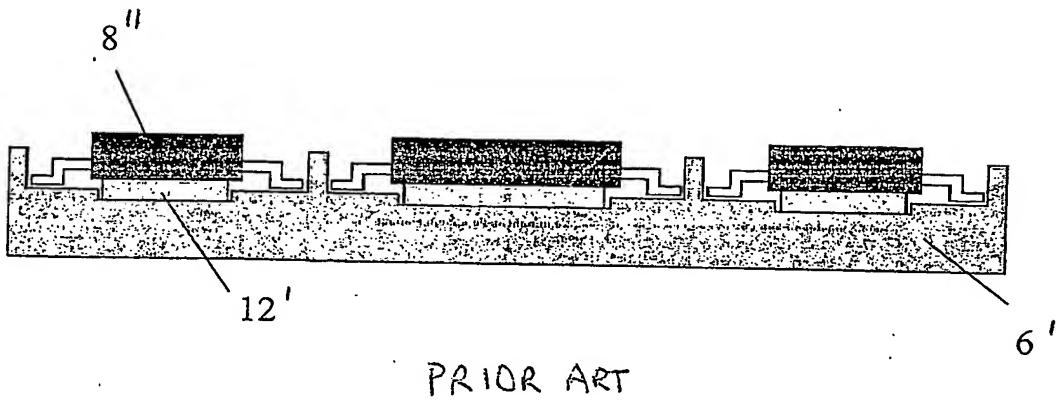


Fig 1

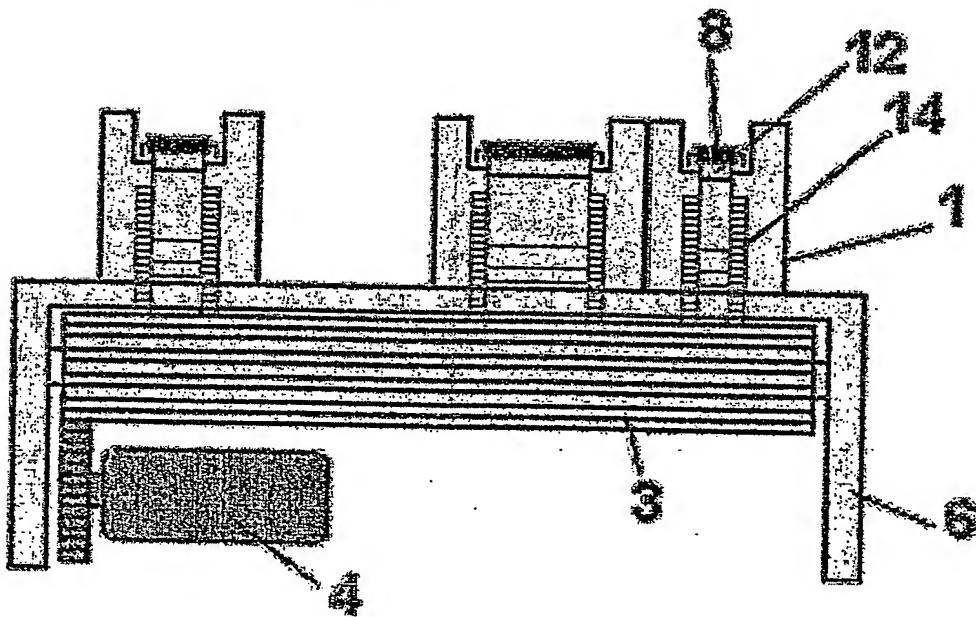


Fig 2

PL 2/3

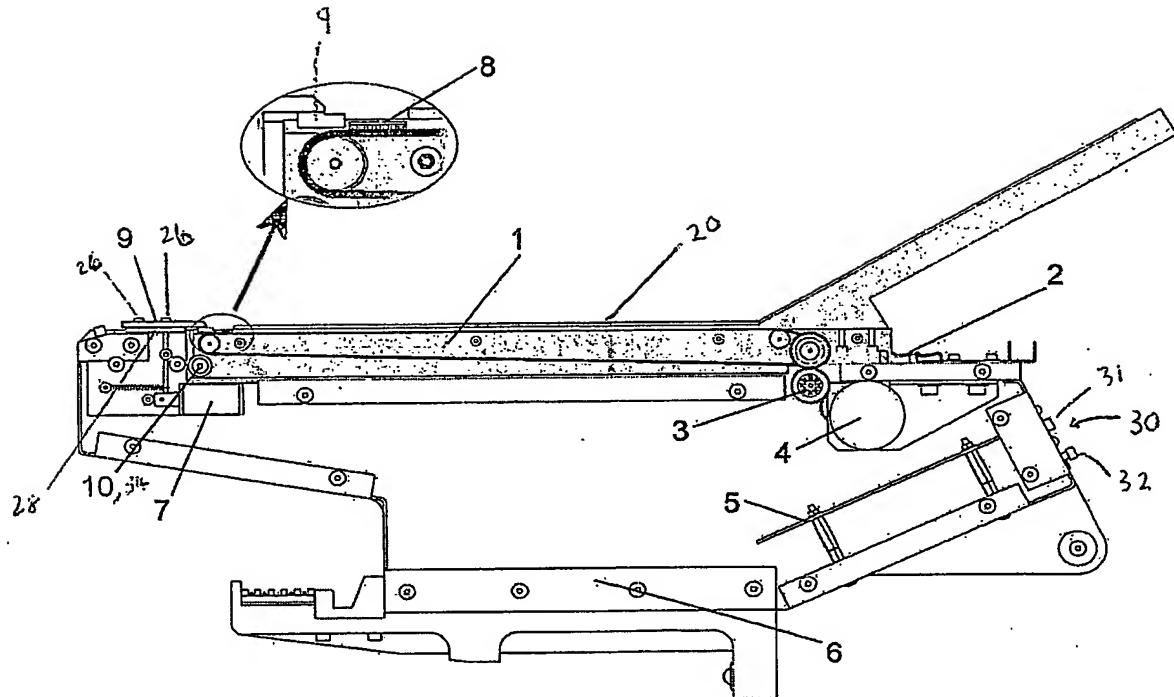


Fig 3

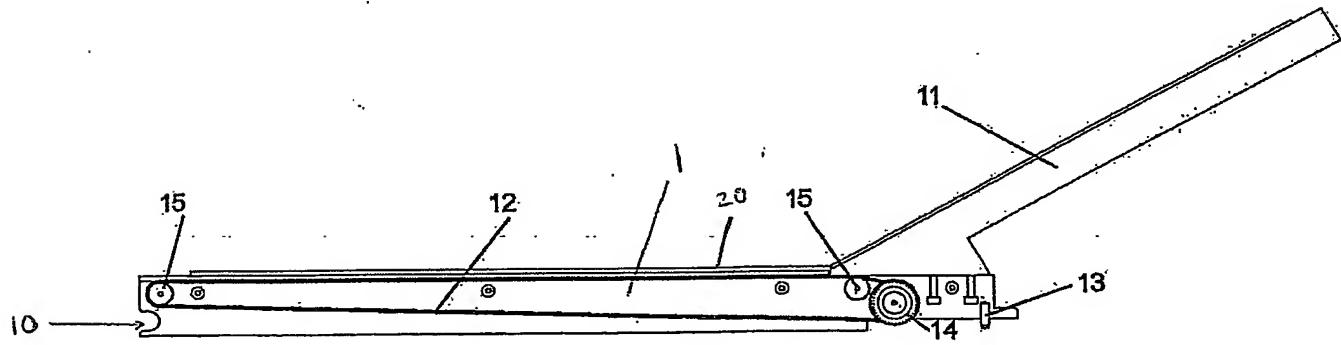
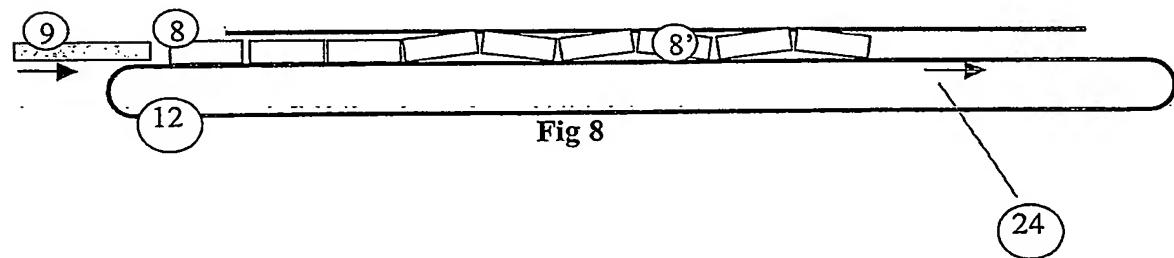
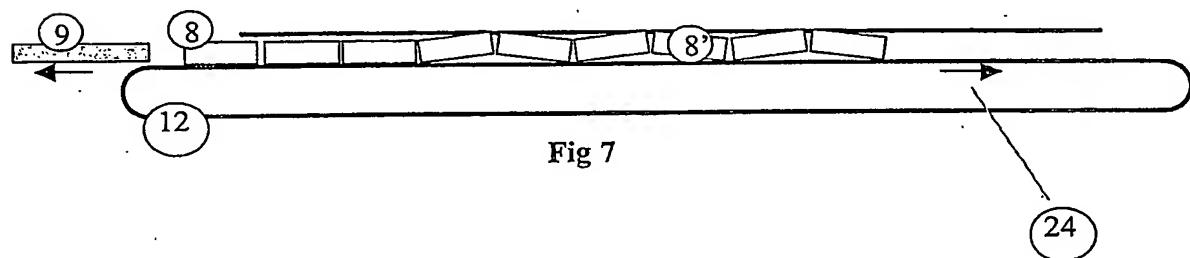
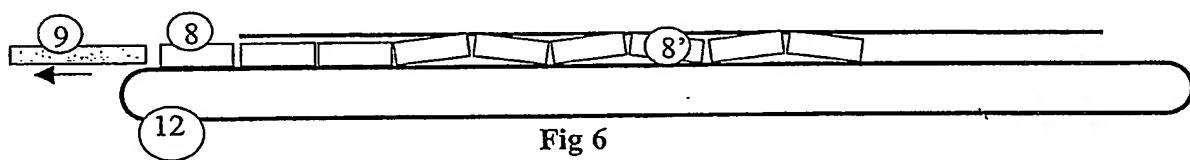
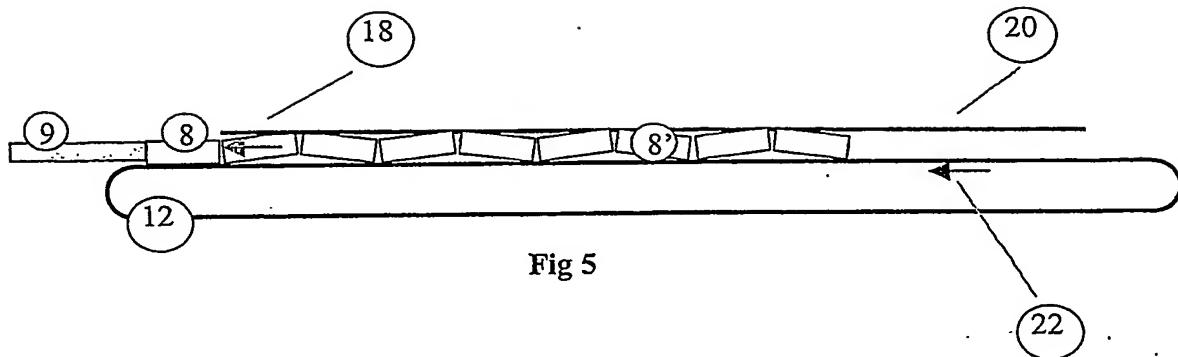


Fig 4



**This Page is Inserted by IFW Indexing and Scanning
Operations and is not part of the Official Record**

BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

- BLACK BORDERS**
- IMAGE CUT OFF AT TOP, BOTTOM OR SIDES**
- FADED TEXT OR DRAWING**
- BLURRED OR ILLEGIBLE TEXT OR DRAWING**
- SKEWED/SLANTED IMAGES**
- COLOR OR BLACK AND WHITE PHOTOGRAPHS**
- GRAY SCALE DOCUMENTS**
- LINES OR MARKS ON ORIGINAL DOCUMENT**
- REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY**
- OTHER:** _____

IMAGES ARE BEST AVAILABLE COPY.

As rescanning these documents will not correct the image problems checked, please do not report these problems to the IFW Image Problem Mailbox.